CLAIMS

1. A ferromagnetic structure for a magnetic resonance imaging magnet comprising:

(a) a pair of ferromagnetic pole pieces; and

(b) a ferromagnetic frame supporting said pole pieces in an opposed relationship so that said pole pieces define a patient-receiving gap therebetween for receiving a patient, said frame defining a flux return path between said pole pieces, said frame including at least one structural element formed from laminated steel layers.

2. A ferromagnetic structure as claimed in claim 1 wherein said flux return path extends through at least one said structural element formed from laminated steel layers.

3. A ferromagnetic structure as claimed in claim 1, wherein said laminated layers are vertically oriented.

4. A ferromagnetic structure as claimed in claim 1, wherein said laminated layers are horizontally oriented.

5. A ferromagnetic structure as claimed in claim 1, wherein one or more of said at least one structural element are is formed of horizontally oriented laminated steel layers and one or more of said at least one structural element is formed of vertically oriented laminated steel layers.

6. A ferromagnetic structure as claimed in claim 1 wherein said at least one structural element includes a pair of opposed pole supports, said pole pieces and said gap being disposed between said pole supports, and one or more flux return members extending between said pole supports.

7. A ferromagnetic structure as claimed in claim 6 wherein said pole supports are formed from laminated steel layers transverse to a polar axis extending between said pole pieces through said gap.

8. A ferromagnetic structure as claimed in claim 6 wherein each said pole support includes a plurality of parts

and at least one part of each said pole support is formed from laminated steel layers.

9. A magnet as claimed in claim 6 wherein said flux return members are formed from laminated steel layers.

10. A ferromagnetic structure as claimed in claim 6, wherein each said opposed pole support comprises:

a pair of longitudinal members extending substantially horizontally parallel to each other and defining a first end and a second end and a center area therebetween; and

a pair of perpendicular members, each said perpendicular member extending substantially perpendicularly from said center area of one of said longitudinal members and having a distal end remote from said center area.

11. A ferromagnetic structure as claimed in claim 9, wherein one or more of said flux return members extends between said pole supports at said first end, said second end, and said distal ends and said flux return members are formed of laminated steel layers.

12. A ferromagnetic structure as claimed in claim 1, wherein said pole pieces are supported in an opposed relationship along a vertical pole axis through said gap.

13. A ferromagnetic structure as claimed in claim 1, wherein said pole pieces are supported in an opposed relationship along a horizontal pole axis through said gap.

14. A ferromagnetic structure as claimed in claim 1 comprising a source of magnetic flux adapted to direct magnetic flux through said patient-receiving gap between said pole pieces so that flux passing through said gap passes from one of said pole pieces back to the other one of said pole pieces along said flux return path.

15. A ferromagnetic structure as claimed in claim 1, wherein said steel layers are low carbon sheets.

16. A ferromagnetic structure as claimed in claim 15, wherein said low carbon sheets are comprised of 1001 steel.

17. A ferromagnetic structure as claimed in claim 15, wherein said low carbon sheets are comprised of 1006 steel.

18. A ferromagnetic structure as claimed in claim 15, wherein said low carbon sheets are comprised of 1008 steel.

19. A ferromagnetic structure as claimed in claim 15, comprising bolts for laminating said low carbon sheets together.

20. A ferromagnetic structure as claimed in claim 15, further comprising epoxy for laminating said low carbon sheets together.

21. A ferromagnetic structure as claimed in claim 15, wherein said low carbon sheets have a thickness in the range of about 0.014 inch to about 0.500 inch.

22. A ferromagnetic structure as claimed in claim 1, comprising a plurality of enclosing structures including walls, a ceiling and a floor together defining a room, wherein said pole pieces and said gap are disposed within the room and at least part of said ferromagnetic frame extends outside said room.

23. A ferromagnetic structure as claimed in claim 6, wherein said one or more flux return members are the walls of a room and are formed of laminated steel layers.

24. A ferromagnetic structure as claimed in claim 6, wherein one of said opposed pole supports is a ceiling of a room and the other of said pole supports is the floor of said room.

25. A ferromagnetic structure as claimed in claim 1, wherein said ferromagnetic frame is a room including a ceiling, a floor and a plurality of walls.

26. A ferromagnetic structure as claimed in claim 6, wherein said pole supports extend substantially vertically to support said pole pieces in an opposed relationship along a horizontal pole axis through said gap and

said flux members extend substantially horizontally between said pole supports.

27. A ferromagnetic structure as claimed in claim 26, wherein said one or more flux return members comprise a pair of upper flux return members defining an upper opening therebetween and a pair of lower flux return members defining a lower opening therebetween, wherein said pole axis is aligned with said upper and lower openings.

28. A method of constructing a ferromagnetic structure for a magnetic resonance imaging device at a site comprising the steps of:

forming a ferromagnetic frame in place at said site, said frame defining a flux return path and including one or more structural elements; and

providing said ferromagnetic frame with a pair of pole pieces in an opposed relationship defining a patient-receiving gap therebetween;

said step of forming said ferromagnetic frame including laminating a plurality of steel layers at said site to form one or more of said one or more structural elements of said ferromagnetic frame.

29. A method as claimed in claim 28, comprising the step of providing a source of magnetic flux in association with said frame.

30. A method as claimed in claim 28, wherein said site is a room within a building.

31. A method as claimed in claim 28, wherein said step of laminating includes bolting said plurality of steel layers together.

32. A method as claimed in claim 28, wherein said step of laminating includes applying epoxy to each of said steel layers.

33. A method as claimed in claim 28, wherein said flux return path extends through at least one of said one or more structural elements formed from laminated steel layers.

34. A method as claimed in claim 28, wherein said one or more structural elements includes a pair of opposed pole supports, said pole pieces and said gap being disposed between said pole supports and said flux return path extending between said pole supports.

35. A method as claimed in claim 34, wherein said pole pieces are supported in an opposed relationship along a horizontal pole axis.

36. A method as claimed in claim 34, wherein said pole pieces are supported in an opposed relationship along a vertical pole axis.

37. A method as claimed in claim 36, wherein said pole supports extend substantially vertically and said flux return path includes a pair of upper members extending substantially horizontally between said pole support and a pair of lower members extending substantially horizontally between said pole supports, said upper members defining an opening therebetween and said lower members defining an opening therebetween, wherein said openings are aligned with said pole axis.

38. A method as claimed in claim 28, wherein said steel layers are low carbon sheets.

39. A method as claimed in claim 38, wherein said low carbon sheets have a thickness in the range of about 0.014 inch to account 0.500 inch.

40. A method as claimed in claim 30, wherein said step of forming a ferromagnetic frame includes forming said room from said frame.

41. A method of constructing a ferromagnetic structure for a magnetic resonance imaging device at a site comprising the steps of:

forming a ferromagnetic frame in place at said site, said frame defining a flux return path and including one or more structural elements; and

providing said ferromagnetic frame with a pair of pole pieces in an opposed relationship defining a patient-receiving gap therebetween;

said step of forming said ferromagnetic frame including the steps of:

laminating a plurality of steel layers at said site to form one of said one or more structural elements; and

laminating a plurality of steel layers to said one structural element to form another one of said one or more structural elements.

42. A method as claimed in claim 41, wherein said step of laminating a plurality of steel layers to said one structural element is repeated until said frame is complete.

43. A method of constructing a ferromagnetic structure for a magnetic resonance imaging device comprising the steps of:

forming one or more structural elements of a ferromagnetic frame defining a flux return path;

providing said one or more structural elements at a site;

connecting said one or more structural elements to form said ferromagnetic frame; and

providing said ferromagnetic frame with a pair of pole pieces in an opposed relationship defining a patient-receiving gap therebetween;

said step of forming said one ore more structural elements including laminating a plurality of steel layers to form one or more of said one or more structural elements of said ferromagnetic frame.